Nuclear Operating Company

South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

October 15, 2009
U7-C-STP-NRC-090168

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

Attached are the responses to the NRC staff questions included in Request for Additional Information (RAI) letter number 224 related to Combined License Application (COLA) Part 2, Tier 2, Section 5.3. This submittal completes the responses to these RAI letters.

The attachments address the responses to the RAI questions listed below:

RAI 05.03.02-2
RAI 05.03.02-3
RAI 05.03.02-4

When a change to the COLA is indicated, it will be incorporated in the next routine revision of the COLA following the NRC acceptance of the RAI response.

There are no commitments in this letter.

If you have any questions, please contact me at (361) 972-7206, or Bill Mookhoek at (361) 972-7274.

D091
NRO

STI 32548783

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 10/15/09, M A McBurnett

Mark A. McBurnett
Vice President, Oversight and Regulatory Affairs
South Texas Project Units 3 & 4

gsc

Attachments:
1. Question 05.03.02-2
2. Question 05.03.02-3
3. Question 05.03.02-4

cc: w/o attachment except*
(paper copy)

Director, Office of New Reactors
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

Kathy C. Perkins, RN, MBA
Assistant Commissioner
Division for Regulatory Services
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

Alice Hamilton Rogers, P.E.
Inspections Unit Manager
Texas Department of State Health Services
P.O. Box 149347
Austin, TX 87814-9347

C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

*Steven P. Frantz, Esquire
A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave. NW
Washington D.C. 20004

*George F. Wunder
*Tekia Govan
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

(electronic copy)

*George Wunder
*Tekia Govan
Loren R. Plisco
U. S. Nuclear Regulatory Commission

Steve Winn
Eddy Daniels
Joseph Kiwak
Nuclear Innovation North America

Jon C. Wood, Esquire
Cox Smith Matthews

J. J. Nesrsta
R. K. Temple
Kevin Pollo
L. D. Blaylock
CPS Energy

RAI 05.03.02-2

QUESTION

The STP 3 & 4 Pressure and Temperature Limits Report (PTLR) is in accordance with Structural Integrity Associates Report No. SIR-05-044-A, Revision 0, which states that if finite element analysis is utilized to develop P-T limits for any RPV region, then additional information shall be provided in the PTLR. PTLR Section 5.0 states that the stress distributions used to develop the P-T limits are based on the stress analysis data calculated by finite element model analysis. However, the applicant has not provided the information described in SIR-05-044-A. Therefore, the staff requests the following information:

a) Identify the computer code(s) that were used in the finite element stress analysis

b) For any computer codes used, describe how the code(s) were verified or benchmarked.

c) Identify the assumptions of the finite element analysis. Necessary inputs to the analysis include any or all of the following:

- A description of plant operating conditions used
- Description of heat transfer coefficients used and the methodology used to calculate them
- A description of the model developed, including materials, material properties, finite element mesh pattern, and geometry

RESPONSE:

a) The actual finite element stress analysis of the STP 3&4 RPVs has not been performed yet, but is scheduled to be completed by the end of 2010. That analysis is being performed using the finite element analysis computer program ANSYS. The analysis results from ANSYS are expected to be bounded by the results presented in the STP 3 & 4 PTLR Rev. 0, and will be reflected in a future revision to the PTLR.

   The analysis currently documented in PTLR Rev. 0 was based on a reference Japanese ABWR. It was performed using the STANSAS computer code, which is also a finite element analysis computer program. The results of the STANSAS analysis are assumed to be representative for STP 3&4 because the configurations and the operating conditions of the STP 3 & 4 RPVs are essentially the same as those analyzed for the reference Japanese vessel. The stress analysis using STANSAS was performed to determine the through-wall thermal and pressure stress distributions for the reference Japanese ABWR RPV, including the nozzles. As noted above, the STP 3&4 plant unique analysis with ANSYS is expected to confirm the analysis results which are currently documented in PTLR Rev. 0.

b) The finite element analysis computer program STANSAS used for PTLR Rev. 0 was verified in accordance with the requirements of ASME NQA-1 subpart 2.7. The RPV vendor, IHI Corporation, performed benchmarking as a part of the computer program verification. The program validation documentation is available at IHI Corporation.

c) The following inputs were used in the finite element analysis:

- With respect to operating conditions, stress distributions were developed based on the stress calculation results, considering the thermal transient conditions of service level A and B (normal and upset conditions) for the shutdown cooling outlet nozzle. The shutdown cooling outlet nozzle was evaluated to be the most critical nozzle among the RPV nozzles under these conditions. The limiting event, which results in the maximum stress on the shutdown cooling outlet nozzle, is just after the reactor coolant temperature decreases from 552°F to 376°F in 10 minutes.

- Heat transfer coefficients were calculated from the governing design basis stress report for the reference ABWR plant shutdown cooling outlet nozzle and from a model of the heat transfer coefficient as a function of flow rate. The heat transfer coefficients were evaluated at flow rates that bound the actual operating conditions in the shutdown cooling outlet nozzle at STP 3&4.

- A two dimensional, axisymmetric finite element model of the shutdown cooling outlet nozzle was constructed. In order to properly model the nozzle, the analysis was performed as a penetration in a sphere and not in a cylinder. To make up for this difference in geometry, a conversion factor of 2.0 times the cylinder radius was used to model the sphere. Material properties were evaluated according to the temperatures during the transient event condition.

No COLA changes are required as a result of this RAI response.

RAI 05.03.02-3

QUESTION

To address PTLR Criterion 2 (GL 96-03), describe how the surveillance capsule specimen examinations shall be used to update the PTLR curves.

RESPONSE:

The shift in reference temperature (ΔRT_{NDT}) will be obtained based on the result of the surveillance capsule specimen examinations. The adjusted reference temperature (ART) will be calculated using the ΔRT_{NDT} in accordance with the methodology specified in Section 2.3 of Structural Integrity Associates Report No. SIR-05-044-A, Revision 0, "Pressure-Temperature Limits Report Methodology for Boiling Water Reactors," April 2007, as shown in Reference 6.1 of the PTLR. The PTLR curves will be updated using the ART.

No COLA changes are required as a result of this RAI response.

RAI 05.03.02-4

QUESTION

To address PTLR Criterion 4(GL 96-03), clearly identify both the limiting adjusted reference temperature (ART) values and limiting materials at the 1/4T location (t= vessel beltline thickness) used in the development of the P-T limits.

RESPONSE:

The ART value at the 1/4T location for 60 EFPY used in the development of the P-T limits is 33.8°F. This limiting ART value is based on the RPV weld material, which is the most limiting material, as shown in PTLR Table 4.

No COLA changes are required as a result of this RAI response.